

A "MORPHED" DIGITAL IMAGE MOSAIC

April 6, 2001

These are mosaicked images of an area near Arlington, Texas. The majority year of photography that comprises each mosaic is indicated in the northeast corner above the image.

1995



If your area of interest is simply too large to be covered by a single photo (as in this sample area provided to a customer from Texas), several adjoining photos can be combined to form a "mosaic" image. A mosaic of this type is defined in the dictionary as "a composite map made of aerial photographs".

If the imagery has been digitally processed and manipulated by computer software, it can be made to look like a single photograph with no apparent seam lines where several photos were "stitched" together. The mosaicked image can also be "rectified" using one of several methods to remove varying amounts of distortion and displacement caused by variables such as the tip and tilt of the aircraft, changes in elevation on the ground, and imperfections in camera lenses.

1970



Prior to the development of computer assisted image processing, mosaics were made by carefully cutting or tearing paper photographs along their edges in an irregular fashion, and gluing them down in such a way that the cut or tear lines were overlapped on adjacent photos and blended-in to hide the lines as much as possible. This mosaic was then re-photographed to produce a single new photographic print. It could be referenced to accurate ground coordinates and labeled a "controlled mosaic", or simply pieced together to form an "uncontrolled" mosaic.

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1956



The sample "digital image" mosaic shown here is of an area near Arlington, Texas, and was produced by first converting photographic prints to digital images by running them through a photogrammetric precision aerial film scanner. The film was scanned at the resolution required to obtain a pixel size of about one meter ground sample distance (GSD). For this film (from the National Aerial Photography Program [NAPP] at a negative scale of 1:40000), this is the equivalent of 1000 pixels per inch.

These scanned photographs were then run through image processing software to tone balance the images and remove "hot spots" common to aerial photographs. Next, by relating known positions on the ground (selected from USGS ortho-photo maps) to their corresponding points on the imagery, the pixels were "morphed" or stretched to fit their adjusted true locations. This corrects the imagery for error introduced by tip and tilt of the aircraft. These images were then tone matched to each other and pieced together (mosaicked) in the computer to look like it could have come from a single frame of aerial film.

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Other, more rigorous rectification methods (that remove all distortion and displacement) are employed at the APFO to ortho-rectify digital imagery for Farm Service Agency (FSA) use. These images can then be used in a computerized Geographic Information Systems (GIS) to measure accurate ground distances and areas, and serve as a photographic base layer for many types of information